

# Some Thoughts on AIS and Organisms in Trade from a Fisheries Perspective



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# Organism in Trade Areas

- Public Aquaculture
- Private Aquaculture
- Bait Industry
- Ornamental Fish and Plants



# Invasive Groups

- Microbes – Pathogens
- Aquatic Plants
  - Phytoplankton to vascular and woody plants
  - Aquatic plant control industry
- Invertebrates
  - Zooplankton to mollusks
- Fish



# Control Areas

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- Pathogen and Disinfection Testing
- Surveillance and Sampling
- Fish Culture
- Fish Transfers and Stocking
- Other Management Actions
- Commercial Fishing
- Bait Industry
- Public Information
- Other Measures





# Fish Hatchery Summary

- Total number of public hatcheries in the Great Lakes region
  - Provincial - 7
  - State - 81
  - Tribal – 3+
  - Federal – 4
  - Cooperative – 10+
- Private hatcheries - 455
- Michigan stocking – 25-50 million/year
  - 26.4 million in 2011
    - 62% DNR
    - 20% Tribal
    - 16% Federal
    - 2% Private



# Fish Hatchery AIS Risks

- Water Supply
  - Open
  - Open with treatment
  - Closed/Protected – Groundwater
- Fish Source
  - Wild
  - Wild with disinfection or quarantine
  - Transferred
  - Transferred with disinfection or inspection
  - Captive broodstock
- Fish Species
- Rearing Location
  - Intensive
  - Extensive



# Fish Hatchery AIS Risk Control

- Policy – GLFC-GLFHC Great Lakes Model Fish Health Program
- Water Supply
- Fish Source
  - HAACP
  - Fish Health Inspection
- Fish Species
  - Selection
- Rearing
  - Biosecurity – Cleaning and disinfection
  - Fish Health Inspection and Treatment

# Determining the Risk of Spreading AIS Through the Bait Industry in Ontario



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# Why concern for ANS in bait industry?

- Bait bucket release suggested as major vector for occurrence of species isolated from their principal ranges
  - (Goodchild and Tilt 1976; Stedman and Bowen 1985; Bestgen et al. 1989; Litvak and Mandrak 1993, 1999)
- Bait industry as AIS transfer vector has been hypothesized
  - (Courtenay and Taylor 1986; Crossman 1991; Tonn 1991; Mandrak and Litvak 1993, 1999; Kerr et al. 2005)
- Occurrence of non-target baitfishes in retail holding facilities
  - (Litvak and Mandrak 1993, 1999)
- Zoogeographic analysis of common baitfishes
  - (Litvak and Mandrak 1993, 1999)
- Despite public outreach, many anglers still release left-over baitfishes
  - (Litvak and Mandrak 1993, 1999; Dextrase and MacKay 1999)



# Great Lakes Regional Bait Industry – Value in 6 State Area

- Baitfish wholesale – Meronek 1994
  - Total Value \$14,176,000
  - Cultured \$ 4,721,000
- Baitfish retail – Meronek 1994
  - Total Value \$150,446,000
  - Cultured \$ 50,099,000

# Ontario's Bait Industry

- About 1,400 bait harvesters in Ontario.
- 3,500,164 dozen baitfish harvested
- 3,069,461 dozen baitfish sold
- Econ. Value: \$37 million (Goodchild 1997), \$20 million (MNR and BAO 2002)
  - *“..the industry suffers from unlicensed harvest and sale of bait and through incomplete or inaccurate reporting...”*
- The Commercial Bait Industry in Ontario – Statistical Report 2002



# Great Lakes Regional Bait Industry – Prices in 6 State Area

- Wholesale
  - Golden shiners \$3.25/lb. - \$ 7.00/lb.
  - Fathead minnows \$0.62/lb. - \$ 11.50/lb.
  - White suckers \$2.00/lb. - \$ 5.50/lb.
  - Goldfish \$3.00/lb. - \$ 7.00/lb.
  - Hornyhead chubs \$9.50/lb. - \$12.50/lb.
  - Willowcats (\$4.00/doz) \$24.00/lb.
- Retail - \$25 - \$42/lb.



# Great Lakes Regional Bait Industry – Production Methods

- Wild harvest
  - Shiners, suckers, chubs, dace
- Semi aquaculture
  - Suckers, golden shiners, fathead minnows
- Aquaculture
  - Golden shiners, fatheads, rosy reds, goldfish

# Standard Commercial Harvest Practice

- Collect fishes by seine or trap,
- Sort fishes at, or between, sites,
- Discard illegal/unwanted fishes,
- Store in holding facility (e.g. pond), or deliver directly to retailer,
- Purchased and transported by angler.



# Key Baitfish Business Steps

1. Present at harvesting location
2. Harvested
3. Detected by harvester
4. Culled by harvester
5. Detected by dealer
6. Culled by dealer
7. Sold by dealer
8. Detected by end user
9. Culled by end user
10. Released live by end user

# Major Bait Harvest Locations

Business	2006 minnow catch (gallons)
Bill's Bait	3,425
DG's Bait	3,626
Dale's Bait	8,730
Gordon's Bait	3,215
Huron Live Bait	2,288
Jeff's Wholesale Bait	7,720
Mackie's Bait	5,985
Michigan Wholesale Bait	2,255
N & N Fur Company	126
Ponderosa Fish Farm	503

- Major minnow catch areas**
-  Bill's Bait Service
  -  DG's Bait, Inc.
  -  Dale's Bait
  -  Gordon's Bait
  -  Huron Live Bait
  -  Jeff's Wholesale Bait
  -  Mackie's Bait & Tackle
  -  Michigan Wholesale Bait
  -  N & N Fur Company
  -  Ponderosa Fish Farm

Estimated Annual Total Wild Bait Harvest = 300 million fish



# Lower Peninsula Wholesale Bait Movement

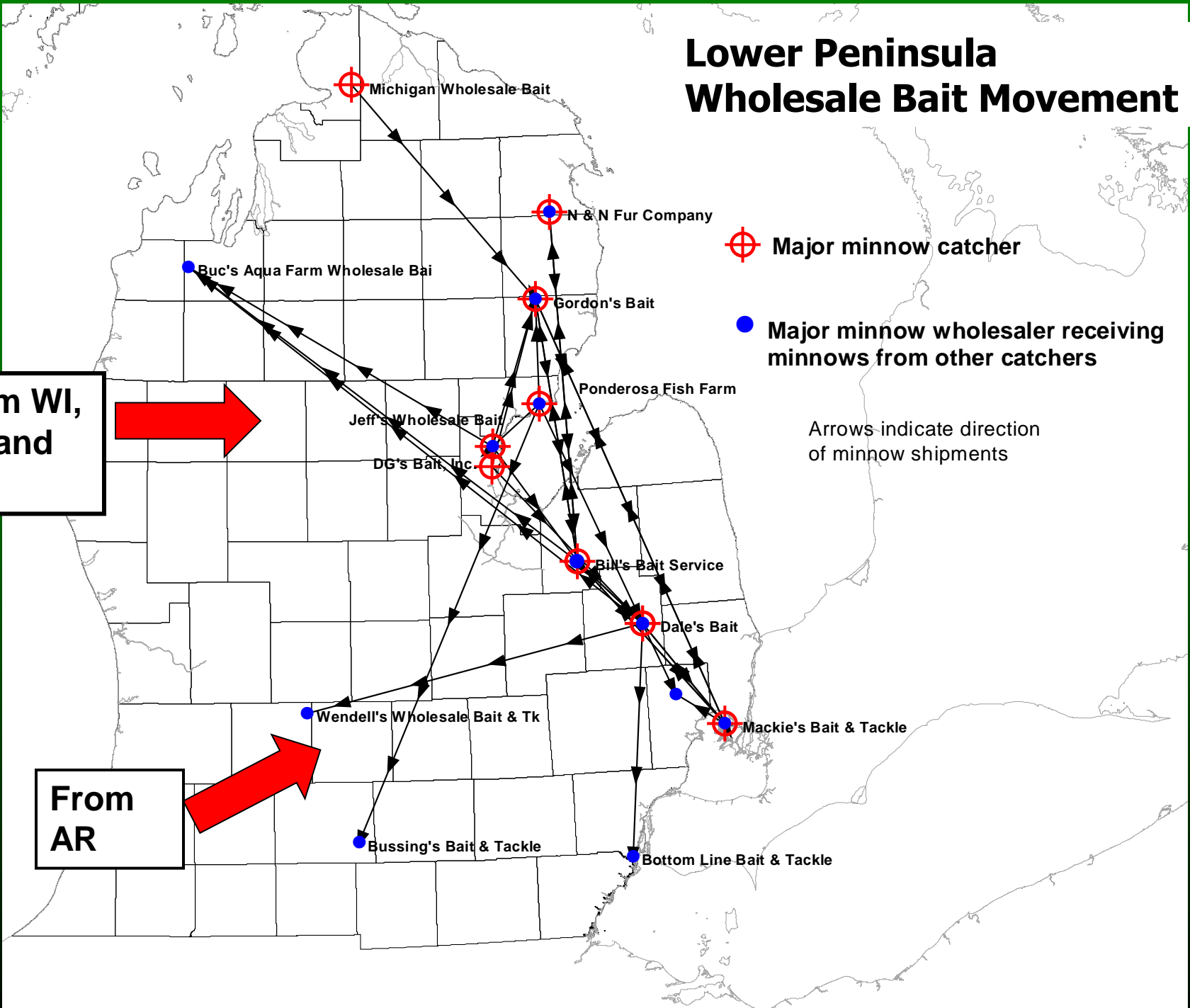
From WI,  
SD and  
MN

From  
AR

Major minnow catcher

Major minnow wholesaler receiving  
minnows from other catchers

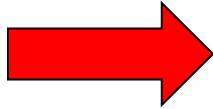
Arrows indicate direction  
of minnow shipments



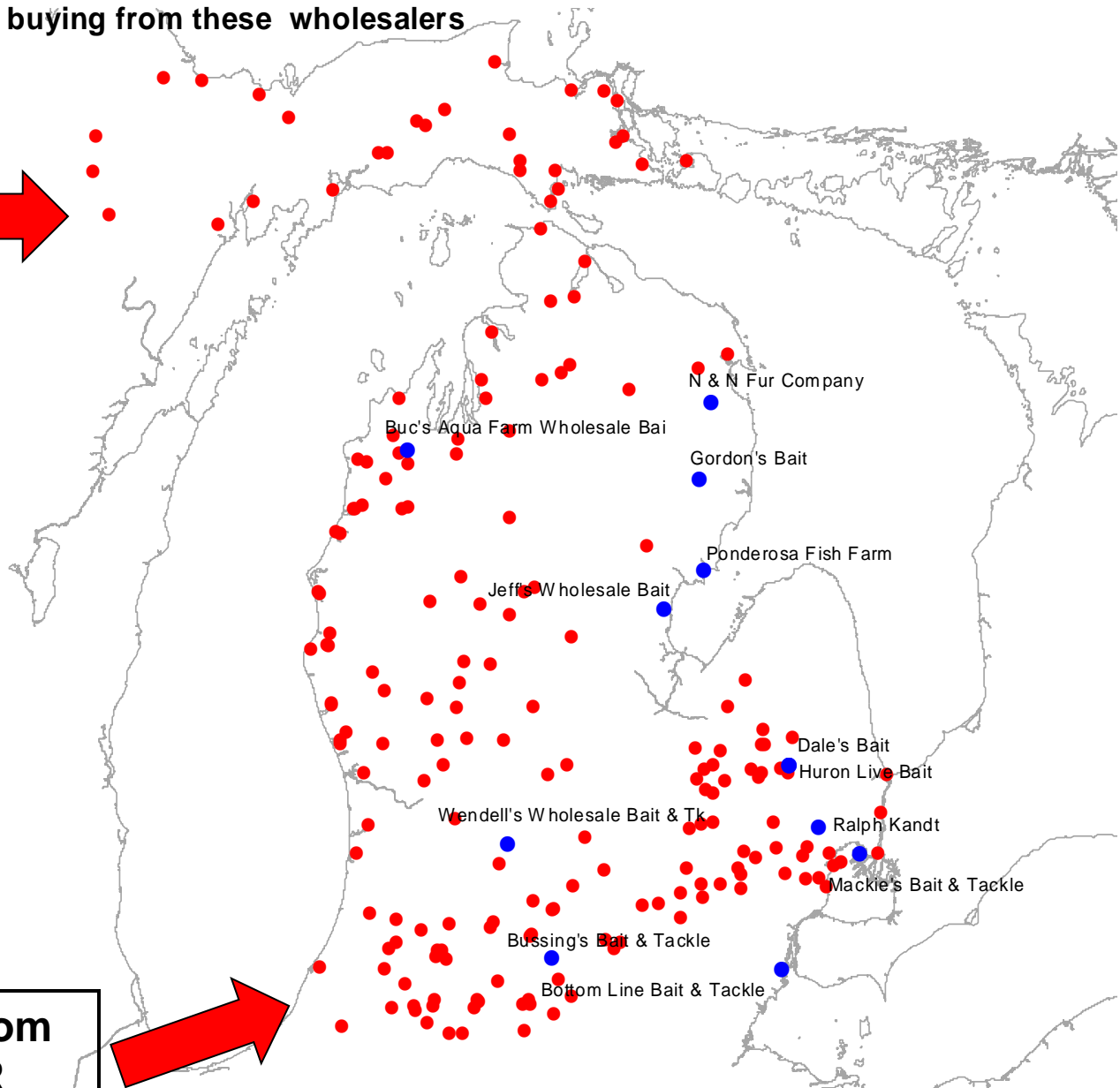
# Wholesale Bait Sales Locations

- Wholesalers buying from other catchers
- Retailers buying from these wholesalers

From  
WI, SD  
and MN



From  
AR





# Bait Industry Opportunities

- HAACP Training
- Industry education
- Improved harvest methods
  - Reduce bycatch
- Increased aquaculture production
  - Reduced wild harvest
- Product inspections
- Better customer awareness

# Questions? Comments?

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